

## **SECTION 702**

### **WET WEATHER PAVEMENT MARKINGS**

#### **702-1 Description.**

Apply wet weather pavement markings in accordance with the Contract Documents.

#### **702-2 Materials.**

**702-2.1 Thermoplastic:** Use thermoplastic material meeting the requirements of 971-1 and 971-10 and listed on the Qualified Products List (QPL) as an approved system. The Engineer will take random samples of the materials in accordance with the Department's Sampling, Testing and Reporting Guide schedule.

**702-2.2 Retroreflective Elements:** Use reflective elements recommended by the manufacturer that meet the requirements of 971-1.7 and are part of the system listed on the QPL.

#### **702-3 Equipment.**

Use equipment capable of providing continuous uniform heating of the striping material to temperatures exceeding 390°F, mixing, and agitation of the material reservoir to provide a homogenous mixture without segregation. Use equipment that will maintain the striping material in a plastic state in all mixing and conveying parts, including the line dispensing device until applied. Use equipment which meets the following requirements:

(a) capable of traveling at a uniform rate of speed, both uphill and downhill, to produce a uniform application of striping material and capable of following straight lines and making normal curves in a true arc.

(b) capable of applying reflective elements to the surface of the completed stripe by automatic dispensers attached to the striping machine such that the reflective elements are dispensed closely behind the installed line. Use reflective element dispensers equipped with an automatic cut-off control that is synchronized with the cut-off of the thermoplastic material and applies the reflective elements uniformly on the entire traffic stripe surface with 50 to 60% embedment.

(c) equipped with a special kettle for uniformly heating the striping material. The kettle must be equipped with an automatic temperature control device and material thermometer for positive temperature control and to prevent overheating or scorching of the thermoplastic material.

(d) meets the requirements of the National Fire Protection Association, state and local authorities.

#### **702-4 Application.**

**702-4.1 General:** Before applying traffic stripes and markings, remove any material that would adversely affect the bond of the traffic stripes by a method approved by the Engineer.

Before applying traffic stripes over portland cement concrete surface, apply a primer, sealer or surface preparation adhesive recommended by the manufacturer. Offset traffic stripes a minimum of 2 inches from any longitudinal joints of portland cement concrete pavement.

Apply traffic stripes and markings only to dry surfaces and when the ambient air and surface temperature is at least 50°F and rising for asphalt surfaces and 60°F and rising for concrete surfaces.

Apply striping to the same tolerances in dimensions and in alignment specified in 710-5. When applying traffic stripes and marking over existing markings, ensure that not more than 2 inches on either end and not more than 1 inch on either side of the existing line is visible.

Conduct field tests in accordance with FM 5-541 and ASTM E2177 (Bucket Method). Take test readings representative of the striping performance. Remove and replace traffic stripes not meeting the requirements of this Section.

**702-4.2 Thickness and Dimensions of Markings:** For flat thermoplastic markings provide a thickness of 0.100 to 0.150 inches when measured above the pavement surface.

As an alternative to the flat baseline, a profiled baseline meeting the following dimensions may be applied. For profiled thermoplastic markings make profile measurements above the pavement surface. Provide a baseline thickness not to exceed 0.050 inches. Provide individual profiles across the full width of the marking on approximately 1.0 inch centers with a space between profiles of approximately .25 inches and an average thickness of at least 0.110 inches above the baseline profile.

Measure, record and certify on a Department approved form and submit to the Engineer, the thickness of white and yellow pavement markings in accordance with FM 5-541.

The Engineer will verify the thickness of the pavement markings within 30 days of receipt of the Contractor's certification. Verification thickness measurements shall be taken in accordance with FM 5-541.

**702-4.3 Dimensions of Audible Bumps:** Apply the raised bump with a profile such that the leading and trailing edge are sloped at a sufficient angle to create an audible and vibratory warning.

Bumps on shoulder and centerline markings shall be at least 0.45 inches at the highest point of the bump, above the pavement surface, including the base line. The height shall be measured after application of reflective elements. Bumps shall have a minimum baseline coverage dimension of 2.5 inches in both transverse and longitudinal directions. Bumps may have a drainage channel, the width of each drainage channel will not exceed 1/4 inch at the bottom of the channel. The longitudinal distance between bumps shall be approximately 30 inches.

**702-4.4 Retroreflectivity:** Apply white and yellow traffic stripes and markings that will attain an initial dry retroreflectivity of not less than  $300 \text{ mcd/lx}\cdot\text{m}^2$  and not less than  $250 \text{ mcd/lx}\cdot\text{m}^2$ , respectively, and also attain an initial wet recovery retroreflectivity of not less than  $150 \text{ mcd/lx}\cdot\text{m}^2$  and not less than  $125 \text{ mcd/lx}\cdot\text{m}^2$ , respectively.

Measure, record and certify on a Department approved form and submit to the Engineer, the retroreflectivity of white and yellow pavement markings in accordance with FM 5-541 for dry and ASTM E2177 (Bucket Method) for wet recovery.

**702-4.5 Color:** Use pavement marking materials that meet the requirements of 971-1.

**702-4.6 Reflective Elements:** Apply reflective elements to all pavement markings, at the rates determined by the manufacturer's recommendations as identified for the QPL System.

**702-4.7 Loss:** If more than 1% of the bumps or more than three consecutive bumps are missing or broken (less than half a bump remaining) within the first 45 days under traffic, replace all failed bumps at no expense to the Department. If more than 2% of the bumps fail within the first 45 days under traffic, the replacement period will extend an additional 45 days from the date all replacement bumps were installed. If, at the end of the additional 45 days, more than 2% of all bumps (initial and replacement) fail, replace all failed bumps at no expense to the

Department. Measure, record and certify on a Department approved form and submit to the Engineer, the loss of bumps.

**702-5 Contractor's Responsibility for Notification.**

Notify the Engineer prior to the placement of the thermoplastic materials. Furnish the Engineer with the manufacturer's name and batch numbers of the thermoplastic materials and reflective elements to be used. Ensure the approved batch numbers appear on the thermoplastic materials and reflective elements packages. Submit a certified test report to the Engineer indicating the striping materials meet all requirements specified.

**702-6 Protection of Newly Applied Traffic Stripes.**

Do not allow traffic onto or permit vehicles to cross newly applied pavement markings until they are sufficiently dry. Remove and replace any portion of the pavement markings damaged by passing traffic or from any other cause, at no additional cost to the Department.

**702-7 Observation Period and Contractor's Warranty.**

Longitudinal pavement markings are subject to a 180 day observation period under normal traffic. The observation period will begin with the satisfactory completion and acceptance of the pavement marking work.

The longitudinal pavement markings shall show no signs of failure due to blistering, excessive cracking, chipping, discoloration, poor adhesion to the pavement, loss of reflectivity or vehicular damage. The retroreflectivity shall meet the initial requirements of 702-4.4. The Department reserves the right to check the color and retroreflectivity anytime prior to the end of the observation period.

Replace, at no expense to the Department, any longitudinal pavement markings that do not perform satisfactorily under traffic during the 180 day observation period.

**702-8 Corrections for Deficiencies.**

Correct all deficiencies by removal and reapplication of a 1.0 mile section centered around the deficiency at no additional cost to the Department.

**702-9 Submittals.**

**702-9.1 Submittal Instructions:** Prepare a certification of quantities, using the Department's current approved form, for each project in the Contract. Submit the certification of quantities and daily worksheets to the Engineer. The Department will not pay for any disputed items until the Engineer approves the certification of quantities.

**702-9.2 Contractor's Certification of Quantities:** Request payment by submitting a certification of quantities no later than Twelve O'clock noon Monday after the estimate cut-off date or as directed by the Engineer, based on the amount of work done or completed. Ensure the certification of quantities consists of the following:

(a) Contract Number, FPID Number, Certification Number, Certification Date and the period that the certification represents.

(b) The basis for arriving at the amount of the progress certification, less payments previously made and less any amount previously retained or withheld. The basis will include a detailed breakdown provided on the certification of items of payment.

**702-10 Method of Measurement.**

The quantities to be paid for under this Section will be as follows:

(a) The length, in net miles, of 6 inch solid traffic stripes, authorized and acceptably applied.

(b) The total traversed distance in gross miles of 10-30 skip line. The actual applied line is 25% of the traverse distance for a 1:3 ratio. This equates to 1,320 feet of traffic stripes per mile of single line.

**702-11 Basis of Payment.**

Prices and payments will be full compensation for all work specified in this Section, including, all cleaning and preparing of surfaces, furnishing of all materials, application, curing and protection of all items, protection of traffic, furnishing of all tools, machines and equipment, and all incidental necessary to complete the work. Final payment will be withheld until all deficiencies are corrected.

Payment will be made under:

Item No. 702- 1      Wet Weather Pavement Markings